



Problem 10 The Prank

A local guru has written a script for extracting necessary information from the PC² databases in the following format:

Team number Problem number Time of submission Judgment
to allow for an alternative way of scoring to be used for our local contest. The local scoring system, which totally ignores the time of submission, is based on adding the values associated with the solved problems for each team and then declares the team, or teams, with the highest score as winner, or winners. If a team has multiple accepted submissions for a particular problem, its value will be added only once to the team's score. The values associated with each problem are selected by the contest organizer and are made public in advance.

Our guru also scrambled the extracted information, by permuting the "Team number" entries, and provided the permutation number as the clue for the organizer. He claims this is a good method to maintain privacy when number of submissions is small. For example, for the contest with four submissions, shown on the left side below, the "Team number" entries have been permuted according to the 9th permutation of four items and shown on the right side.

3 2 765629 0	17 2 765629 0
17 4 1120132 0	3 4 1120132 0
3 2 1895629 3	3 2 1895629 3
6 3 9024555 0	6 3 9024555 0

You may recall that the number of permutations of "x" items is "x!". The table below shows the permutations of four (4) items sorted in lexicographically increasing order, as an example, along with their permutation numbers from 1 to 24.

1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
2	2	3	3	4	4	1	1	3	3	4	4	1	1	2	2	4	4	1	1	2	2	3	3
3	4	2	4	2	3	3	4	1	4	1	3	2	4	1	4	1	2	2	3	1	3	1	2
4	3	4	2	3	2	4	3	4	1	3	1	4	2	4	1	2	1	3	2	3	1	2	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Your task is to write a program to use the data provided by our guru, descramble the “Team number” entries, and to declare the winner, or winners.

INPUT:

Input to this problem consists of a sequence of one or more contests. Each contest is described by several lines as follows:

- The first line consists of four integers: the contest label N , $0 < N < 10$; the number of problems, P , $0 < P < 12$; the number of teams, T , $1 < T < 300$; and the number of submissions, R , $1 < R < 13$. The integers are separated by a single space.
- The second line contains the permutation number, given as an integer, which is used to scramble the “Team number” entries.
- The third line contains P integers, separated by single space, that describe the values for the P problems given in ascending order of problem numbers. Problems are numbered 1 to P , and their values will be less than or equal to 100.
- Each of the following R lines describes the data about one submission, which consists of four (4) integers separated by a single space. The four integers describe team number, problem number, time of submission in milliseconds from start of the five (5) hours contest, and the judge’s decision (zero for accepted, and non-zero for rejected).

The input will be terminated by a line that consists of four zeros (0 0 0 0), separated by a single space. This line should not be processed.

OUTPUT:

For each contest, the output is one line that contains the contest label and numbers of the winning team numbers (sorted in increasing order) as shown in the Example OUTPUT below.

EXAMPLE INPUT:

```
1 5 20 6
6
3 3 10 30 100
6 1 16024555 0
3 2 15895629 4
3 2 765629 0
6 4 1120132 0
3 2 1895629 3
17 3 9024555 0
2 5 20 7
120
3 10 10 30 100
10 4 2895629 0
6 1 16024555 0
6 2 15895629 5
5 2 765629 0
17 4 1120139 0
3 4 1895629 0
3 3 9024555 0
0 0 0 0
```

EXAMPLE OUTPUT:

```
Contest 1 Winner: Team 17
Contest 2 Winner: Team 5 and Team 10 and Team 17
```